HOW TO RELOAD SHOTGUN, RIFLE & PISTOL SHELLS

HERTER'S, INC.

WASECA, MINNESOTA

BY GEORGE LEONARD HERTER AND JACQUES P. HERTER

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Third Edition

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CAST LEAD ALLOY RIFLE BULLETS

Rifle bullets are cast the same as casting pistol bullets. See the pistol bullet casting section of this book for this information.

For low velocity rifle bullets 1 part tin to 15 parts of lead are used.

For medium and high velocity cast rifle bullets 1 part tin to 10 parts of lead are used.

Cast lead alloy rifle bullets are nearly a thing of the past and today are rarely seen or used.

SWAGED LEAD ALLOY RIFLE BULLETS

Swaged rifle bullets are rarely used. They are swaged by the same methods as used to swage pistol bullets.

SWAGED HALF JACKET OR PARTIAL JACKET RIFLE BULLETS

These rifle bullets have a partial jacket of gilding metal made up usually of 93% copper and 7% zinc. The lead cores are made of 1 part antimony to 40 parts of lead. These bullets usually are made from groove diameter to as much as 2 thousandths of an inch over groove diameter. They are not at all satisfactory. The gilding metal jacket tends to separate from the core as the bullet goes through the barrel. Fire several into cotton batting and look them over. You will notice that the base of the bullets are not at all level. If a bullet leaves the barrel of a gun with a base that is not level the powder gases tilt the bullet giving it terrific yaw and poor accuracy.

George L. Herter tested these bullets in 1945 at Fabrique Nationale Herstal; Belgium and found them to be unreliable.

SWAGED HALF JACKET OR PARTIAL JACKET RIFLE BULLETS WITH CRIMPED JACKETS

In late 1961 George L. Herter invented a die that would crimp the front edge of the gilding metal jackets of these bullets into the lead cores in one operation. There are patents pending on this process. The bullet jacket then will not separate from the core of the bullet as it goes through the barrel and they shoot accurately. The dipped in area caused by the crimp also catches the lead smear of the bullet and prevents leading. Dies are now available for making and crimping these bullets in one operation. Such bullets make good, short and medium range target bullets and good small game bullets.

METAL JACKETED BULLETS MUSHROOMING TYPES

Most jacketed bullets have a jacket made of gilding metal. This is often spelled "guilding" or "Guilders metal." The name comes from the French word Guildes meaning a group of craftsmen. It was also spelled Gildes. The copper Guilds used a mixture of about 90% copper and 10% zinc for many purposes and gilding metal comes from this.

Gilding metal bullet jackets are made from a mixture of copper and zinc from 95% copper to 5% zinc to 90% copper and 10% zinc. Uusually 93% copper and 7% zinc. Fabrique Nationale, Herstal, Belgium uses 93% copper & 7% zinc. The United States government uses 90% copper and 10% zinc for gilding metal. Pure copper itself is never used for bullet jackets as it is much too soft.

Cupro-nickel bullet jackets are rarely used. They foul the barrel much more than gilding metal jackets. They are made of mixtures of copper and nickel. Formulas vary from 60% copper and 40% nickel to 86% copper and 14% nickel.

Lubaloy bullet jackets are simply gilding metal jackets with a little tin added. This lowers the melting point of the gilding metal theoretically making it go through the barrel easier. This is very questionable. It does make the jacket smear on barrels easier and fouls barrels more than good gilding metal.

The English use a similar gilding metal with a small amount of tin and call it Nobeloy which has not proved very satisfactory.

STEEL JACKETED BULLETS

These have been made in both Europe and North America for a great many years. The steel is usually plated with cupro-nickel or copper. Copper for low velocity bullets and cupro-nickel for high velocity bullets. The best steel jacketed bullets are not plated at all but the sheet that they are formed from is made from a billet of gilding metal with a billet of steel inside of it. The billet is rolled out making a sheet, steel on the inside with gilding metal on the outside. In the United States this process is called the "copperweld process." I have a fence in my back yard made of copper covered steel wire made by the same process. The Germans use the same process to make steel bullets called "Trico" only they put a billet of steel inside of a billet of cupro-nickel and roll it out. Some of the self-styled authorities go into great detail telling how they fuse a sheet of steel between two sheets of cupro-nickel to make these bullet jackets. Not a word of truth to it. They just were guessing as they usually do and guessed wrong.

Unplated steel jacketed bullets were made by The United States Cartridge Company of Lowell, Mass., in 1917 for the .280 Ross rifle. They took out the bores quickly as can well be imagined. Winchester in 1900 manufactured .30/40 Krag cartridges 220 grain bullets with steel jackets cupro-nickel plated.

Frankford arsenal made steel jacketed bullets cupro-nickeled for the Krag from 1894 to 1900. They made 129,000,000 of them. The cases themselves were tin plated. The English have long made steel jacketed bullets plating them mostly with pure nickel. The Germans and Belgians have made steel bullets off and on since 1890.

In 1920 Frankford Arsenal made some 170 grain .30 caliber bullets with cupro-nickel jacketed bullets. They then gave them a light tin plate believing that it might help lubricate the bullets. The lubricating effect of the light tin plate was zero as they should have known. The tinned bullets however set up an electrolosis process with the brass of the cartridge cases and corroded right into them. It usually takes 50 to 90 pounds to pull a .30 caliber bullet but these took about 600 pounds to pull out. Sporting ammunition manufacturers had been giving their gilding metal jacketed bullets a light tin wash to keep them more attractive on the shelf when stored for long periods of time. After this fiasco by the arsenal they all stopped doing this. It is an ill wind that doesn't blow someone some good.

Steel jacketed bullets are hard on rifle barrels and have never become popular. If the lands cut through the nickel, cupro-nickel or copper coat over the steel, the barrel wears out rapidly. If they do not cut through, you still get excessive barrel wear because of the added pressure needed to form the jacket to the barrel grooves. Steel jacketed bullets, unless made with a diameter less than barrel groove diameter tend to up pressures.

HOW JACKETED BULLETS ARE MADE

A sheet of gilding metal or cupro-nickel is run through a punch press. Cups are stamped from it. These cups are then run through drawing machines. These drawing machines are simply powerful punch presses. The metal is rarely annealed as it is being drawn, as annealing tends to make it soft. Bullet jackets today have to be pretty hard to stand the high velocities without stripping. For example the 30-06, 180 grain bullet takes five draws to complete the jacket. The .30 caliber 220 grain round nose just 4 draws to complete the jacket.

The jackets are then trimmed to the exact desired length in a special machine for this purpose.

Lead wire for the bullet cores is made as follows. One part antimony to forty parts of lead are either bought or cast into pigs or blocks. A few makers use pure lead. None use tin any more. The pigs are put into a lead wire extruding machine. The machine squeezes the pig and extrudes out the lead wire. A good lead extruder will easily extrude 3,000 pounds of wire per hour. Extruded lead wire has no holes or air pockets in it. Lead wire cannot be extruded in molten form. The lead wire is cut into slugs slightly larger than the weight of the bullet cores. The slugs are fed into a machine that puts the slug in a jacket and forms the jacket around it extruding the surplus lead from the top of the jacket. These machines in some cases are punch presses with a rotary table. Carboloy dies are used to eliminate wear. As I write this complete machines are available that will make the jacket and bullets all on the same machine producing 3,500 complete jacketed bullets per hour. Cost of the machine is $28,000 tooled up for one bullet. Tooling for each additional bullet is $1,000. In the

past some American bullet makers adapted standard machines such as punch presses to bullet making. At best such machines are makeshift. The bullets such adapted machines produce are not at all equal to the bullets produced on the new fully automated bullet makers.

METAL JACKETED RIFLE BULLETS WITH THE TIP COVERED BY THE JACKET

Military bullets are all of this type as the war games rules specify no soft nosed bullets.

A few bullets used in Africa on elephant, rhino, and buffalo are also of this type. They give deep penetration.

Although solid bullets are used a great deal in Africa on elephant, rhino, and buffalo, soft nosed bullets are replacing them more and more. For heart and neck shots soft nosed bullets are actually usually more effective. Solid bullets are only really good on elephant brain shots. Even here, a moderately expanding soft nose bullet does a better job.

KINDS OF EXPANDING BULLETS

Through the years about every possible method to cause bullets to expand or to cause the most destruction of flesh tissue has been tried.

By far the best mushrooming and best penetrating bullets are still those with a simple exposed lead bullet core tip.

For big game, you want a bullet that will mushroom, keep on penetrating and not blow up.

For varmints, in congested areas where you do not want bullets to richochet, you want a bullet that has a light jacket and blows up. Such bullets produce wounds about 10 inches deep which is sufficient on woodchucks, foxes, etc. and even on some larger game. I myself never even hunt foxes with bullets that blow up, as I cannot see the sense of wasting the pelt of a good fox. It just is not sporting. A man who goes around shooting rabbits with bullets that blow them up is no sportsman. Rabbits are fine eating and their flesh should be saved and eaten. If you are too "snooty" to eat them yourself, see that they get to people who will appreciate them or do not kill them. By using bullets with heavy jackets or slowing down your loads you can kill game just as dead but save its flesh and pelt. Waste is still a sin no matter how much you try to gloss it over.

Just for an example, a bullet that comes out of a barrel with a 12 inch twist rotates once every 12 inches. At 3,000 feet a second it rotates 3,000 times per second. This rotation does not slow down as fast as velocity slows down. It slows down only by friction of the bullet against the air as it spins. When the bullet strikes, centrifugal force exerts outward pressures on the jacket of the bullet. If the jacket is light, the jacket will break up causing a large shallow wound. If the jacket is heavy, the bullet will mushroom well on impact force alone and penetrate well causing a deep wound. Centrifugal force is only effective against something it can easily shatter, not at all against something it cannot. The flywheel of your car has terrific centrifugal force, but it never causes the flywheel to fly apart or damages it in any way.

A bullet traveling at a high velocity without spin at all, mushrooms and penetrates perfectly. This was proved by the Belgians as early as 1900 and by the Germans just before World War II.

A would-be authority wrote a book on handloading. It is a long book on many subjects but in my opinion does little to tell anyone how to actually reload properly. He tries to bring out that the rotation of a bullet has a lot to do with the size of a wound a bullet makes and how the bullet mushrooms. Such a theory is not at all based on fact. The strength of the jacket of the bullets control the effect of the spin on the mushrooming entirely. In this same book he goes on to say that the English shooter only desires a bullet with lots of shocking power hunting lion, tiger, or elephant in the jungle country of British East Africa. There are no tigers in any part of Africa and this is very common knowledge among hunters. Lions are not a jungle animal at all but a plains animal. He copied Dupont and Hercules old pressure tables which they discontinued printing because they knew that many of them were inaccurate. To me, this book is mostly obsolete. He obviously had little hunting experience, which is necessary if you are going to set yourself up as an authority on bullets. He talks about shooting rabbits and squirrels with a .357

revolver and a bobcat in a trap, a sick horse and a few 50 pound Roe deer in Germany after the war was over. In World War II, he was given a commission in Army Ordnance Intelligence. We had thousands of enlisted men well qualified in the ammunition field, as a simple test would have shown. If the army ever threw out petty politics and gave the enlisted men a chance at the good jobs, we would have an army that could lick anyone with one hand behind their back and good men would stay in the army.

He had no combat experience. To me, this is necessary if you want to talk authoritatively about bullets and guns. Talking a good game and playing it is very very different. I lost a lot of good friends in the last war because of the blunders of Army Ordnance personnel who talked big but blundered for lack of practical experience and it is a bitter and unjust pill to take.

I had a number of experiences like this that are hard to forget.

I was with a 9th Infantry Division Heavy Weapons Company for a while in World War II. We had just come out of the line for a rest. Everyone was very nervous and in bad mental state. We were just lying around a small wooded area safely back of the line trying to do nothing, which is hard to do when you are in a generally upset condition.

A spic and span Ordnance Captain with a little mustache drove up in a spic and span jeep with a spic and span sergeant for a chauffeur. He came over to where a group of us were lying down. He said, in an authoritative manner, that he was from Ordnance Intelligence headquarters in Paris. He acted as if we should ask him for his autograph. He began talking to one of the Lieutenants. He told him if any of the men captured any of the following rifles he would pay them for them. They were a list of hunting rifles and some antique rifles. The lieutenant was in a very worn down mental condition. His eyes had a strange vacant look and his face was pasty and his movements slow. The lieutenant who had been company commander had been killed the day before. A mortar shell had hit right beside him and made him into pieces of bloody clothing. The company's last captain had gotten a ten thousand dollar wound sometime back by a sleeper rifleman. The lieutenant looked at the captain and in a low soft voice said, "Do you think we are doing this for money?" I said, "Captain these guys will kill you just for a change of luck, you better get out." He paled a little and he and his sergeant walked rapidly back to their jeep and drove away to try to find a more sociable outfit where they could barter or steal some guns or foreign ammunition.

Such field trips, they referred to as brave trips going up to the front line. They often tell how they picked up ammunition and souvenirs from a dead enemy soldier. In many cases it was weeks after the fighting had left an area before the enemy dead were buried. Civilians got so tired of the sweet sickening smell that they buried what was left of them.

FINELY SPLIT JACKET MUSHROOMING BULLETS

Four to six longitudinal saw cuts about ¼ inch long are made on the sides of the nose of a full jacketed bullet. The nose itself is left intact. When the bullet strikes the tip of the bullet comes off and the bullet really mushrooms.

The British .303 Mark IV 215 grain round nose soft pointed bullet had a split bullet jacket besides the soft exposed nose. They used these bullets in India and Africa. They would make a hole big enough in a man's chest to put your whole arm through. They were outlawed by the 1899 Peace Conference held in Switzerland.

DUMDUM MUSHROOMING BULLETS

The British have always had great faith in mushrooming bullets and have always used them in one form or another regardless of International law.

The dumdum bullets were made by the Dumdum Arsenal in Bengal, India, 6 miles northeast of Calcutta. This arsenal is still in operation. The bullet was a .303 full jacketed round nose bullet with the nose filed off automatically in manufacture so that the lead core was exposed. These bullets gave deep wide wounds and would cut a man's arm off with no trouble at all. They were outlawed in 1899 by the Peace Conference together with the use of shotguns using buckshot.

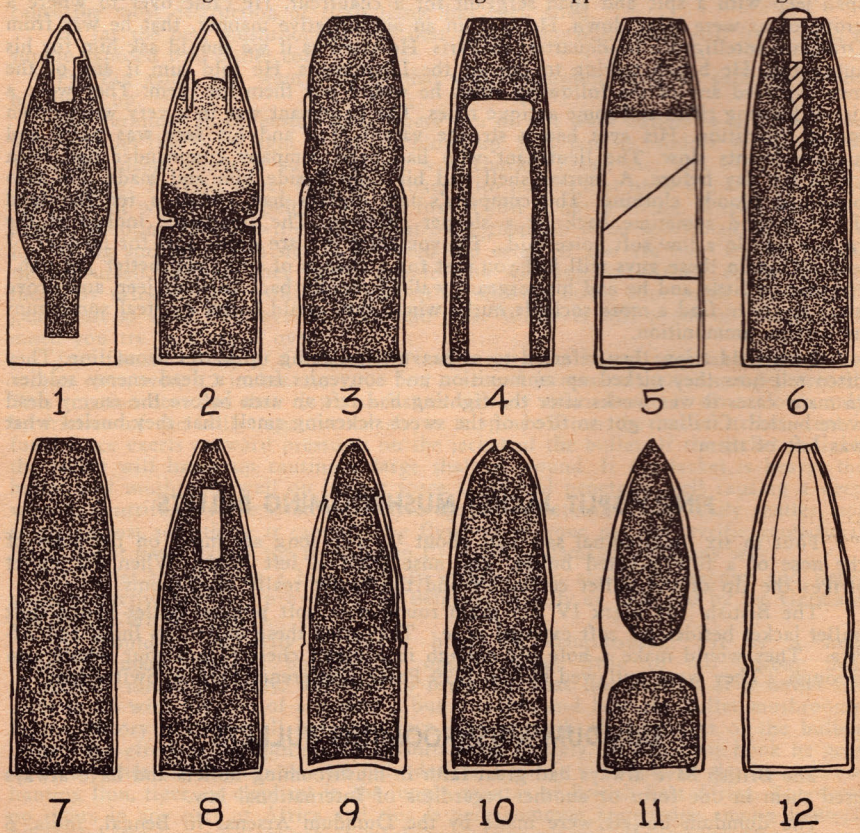
ALUMINUM NOSE TUMBLING BULLETS

The British did a great deal of research on bullets. They found that the spitzer bullet itself with a full jacket often tumbled in flesh causing severe mushroom type wounds. The balance point of spitzer bullets is, of course, toward the rear and causes such bullets to tumble in flesh. Actually a spitzer military full jacketed bullet will rarely go straight through a large animal. I have seen not a few but actually hundreds of moose, deer, bear and antelope killed with them and they usually have a very good stopping effect on the animals.

To make sure that their military bullets tumbled every time, the British took the "Velopex" hunting bullet designed by Leslie B. Taylor who worked for the gun making firm of Westley Richards Ltd. of Birmingham. This was a spitzer bullet with the nose of the bullet filled with wood or fibers or for that matter anything light in weight. The British army decided to use aluminum in the nose of the bullet. When the bullet strikes, because the weight is way to the rear it tumbles. Centrifugal force has no effect on these bullets at all. They just tumble end over end against centrifugal force. The wounds that they produce are tremendous.

COPPER TUBE MUSHROOMING BULLETS

Various hunting bullets have a short length of copper or other tubing in the



Cutaway views of some of the many methods used to make bullets mushroom. This is by no means all of the methods used but just a few of the better known methods. In cutaway 12 the lead core is not shown, as if it were shown, the inside cuts in the jacket would not show. All other drawings show the lead cores in place.

nose of the bullet and a gilding metal or cupro-nickel cap over it. Causes mushrooming but at high velocities causes bullet break up, which is bad on big game.

1. STARKMANTELGESCHOSSE MUSHROOMING BULLETS

This simply means "Strong Jacket" in German. These bullets were made by the Berlin Karlsruher Indistrie Werke AG. The jacket was made of gilding metal. The base of the bullet's jacket was made heavy so that it would hold together. The front of the jacket was made light so that it would mushroom easily. The nose has a copper tube protected point. It is really surprising that a company like this would get out such a stupid bullet that most any American reloader could tell simply by looking at it that it would not work. The heavy base jacket, of course, does not allow the lands of the barrel to form into the jacket properly and the pressure goes up and the velocity goes down. The same mistake was made on the Nosler bullet when it first came out. They then cut away an area to lessen some of the excess pressure.

The Strong Jacket bullet mushrooms fairly well.

One so-called authority made some rather strong statements in his book on handloading about the kind of bullets German hunters used and hence why the Strong Jacket bullets were made. In his opinion, all hunting in Germany was done by rigid rules and the present system was to track the animals. The German hunters demanded a bullet which not only expanded but would go right through the animal and make a large wound on the opposite side to produce a large blood trail if the animal did not go down when hit.

Just to get the record straight, in Germany the large stag or red deer and the wild boar are the main and only big game. The roe deer are small deer going around 50 pounds. Stags will go up to six or seven hundred pounds. Wild boar around 150 to 300 pounds. These Strong Jacket bullets will not normally shoot through either stags or wild boar unless you gut shoot them which in Germany is rarely done and very much frowned upon. They will not even usually shoot through a roe deer hit in the shoulder.

German hunters do not demand a bullet which will expand and create a serious wound and go right through the animal. This is asking a little too much for anyone who knows hunting ammunition. If this was at all true, they would not use such bullets as the H Mantel type which causes a large surface wound by losing the whole front of the bullet when it strikes and is a very poor penerating bullet. There are no such "laws" in Germany regarding bullets and never were.

2. H-MANTEL MUSHROOMING BULLETS

This bullet is made by Rheinisch-Westfa Lische Sprengstoff Actien Gesellschaft who makes Germany's well known RWS brand ammunition. The jacket of the bullet is folded to form a small partial partition in the bullet. The lower part of the bullet is loaded with a hard high antimony content lead, the front part with soft lead. The nose is a protected hollow copper tube. The jacket is Trio-Metal. Made from a billet of soft steel enclosed in a billet of cupro-nickel. The billet is then rolled out to form a sheet with the steel in the center and the cupro-nickel on each side of it. This process is called the copper weld process and is widely used on various American products. This process is superior to simply plating both sides of a steel sheet with cupro-nickel as all electrical chemical plating processes plate on a rather porous plate. To seal the pores you have to buff it well. Cupro-nickel jacketed bullets foul barrels more so than gilding metal jackets and are obsolete. In the old days DuPont number 15½ and 17½ powders which contained some flake tin were used in an effort to stop the fouling but the tin bearing powders themselves fouled barrels and were discontinued.

The front part of the H-Mantel bullet breaks up much too easily causing a shallow wound. The base alone is left which, of course, greatly reduces the weight of the bullet left to penetrate and penetration is very poor. Any hunter knows that this is just what you do not want in a big game bullet. Still fairly popular in Germany however.

3. REIFRING MUSHROOMING BULLETS

This was an early German effort for a mushrooming bullet and a complete failure. The bullets were made with a gilding metal jacket up to about the middle of the bullet then crimped in to keep it from separating from the bullet core as it went through the barrel. In some cases the jacket had a base in it, in others none at all. A band of gilding metal or copper was just forced around the front part of the bullet. The idea was that the belt or ring would hold the soft lead front half of the

bullet together long enough to penetrate then the band would break and allow the bullet to mushroom down to the half jacket. It did not work at all.

Some very few of the jackets of such bullets were made of steel. It did not take the Germans long to find out that raw steel jackets ruined their rifle barrels.

The Peters corporation owned by Remington who in turn is owned by Dupont brought out a belted bullet which also was a complete failure.

4. QUILLE PROJECTILE ACIER

A Belgian designed bullet made for African hunting and abandoned as it was a complete failure. The jacket was gilding metal with a steel pin set in the jacket and surrounded by lead. The lead had to be put in molten form to keep from getting air around the head of the pin. When the bullet hit game, the steel pin moved out of the core and into the game giving little penetration and causing little tissue damage. The lead core just broke up. A full jacketed bullet with a lead core obviously penetrated much better and more accurately.

The Germans who have always been very close with the Belgians on ammunition and arms development made these bullets, calling them the Stahlkern or "Steel Kernel." They were not at all a success as could well be imagined.

One "authority", said they were widely used in African hunting. I have never seen them listed as available on the ammunition lists put out by the only suppliers of ammunition in Africa. How wrong can you be?

5. TEILKERN MUSHROOMING BULLETS

Made at one time by RWS in Germany. A real Rube Goldberg affair and a real turkey of a bullet. The jackets were steel, with a short soft lead nose. The base of the jacket was made up of three or four pieces of aluminum sometimes all cut at an angle sometimes not. At 2,000 feet or thereabouts the lead nose would, on striking, burst open the steel jacket, scattering the pieces of aluminum. The pieces of aluminum were supposed to fly out and cause individual wounds something that they did not do. You can well imagine that light weight pieces of aluminum could not cause deep or large wounds. The bullets were so inaccurate that you had to have special sights on the rifle you shot them in, in order to hit anything. Real heavy thinking.

6. VIS PROJECTILE MUSHROOMING BULLETS

A Belgian designed mushrooming bullet. A brass or steel wood screw was threaded into a drilled hole in the end of the bullet. Surprising as it may seem this produces one of the finest most positive mushrooming and penetrating bullets ever made. The same method has been used on all lead alloy pistol bullets. It is too simple for modern factory ammunition makers to use.

7. SLEEVE MUSHROOMING BULLETS

This is simply a lead alloy core with a gilding metal jacket open on both ends. Sometimes just a band around the bullet and crimped in. The German Rationell was the latter type. Mushroom poorly. Used only for a very short time and dropped.

8. PROJECTILE COMPRENANT CAVITE D' AIR MUSHROOMING BULLETS

These bullets were developed in Belgium, tested and dropped as entirely unsatisfactory.

The bullet had an air chamber in the nose and a hollow point. The theory was that the enclosed air chamber would aid the uniform mushrooming of the bullet. The lead of the core however tends to move forward and close the air pocket on impact. The Dominion Cartridge Company of Canada made a similar bullet with an air cavity in the tip. They called it the "Pneumatic." They were not at all satisfactory, sometimes mushrooming and sometimes not at all.

9. WINCHESTER SILVER TIP MUSHROOMING BULLETS

Has a nickel and copper cover for the nose. The cover extends far down into the bullet jacket. As well might have been expected the cover reinforced the tip of the bullet and kept them from expanding at all. The strength of the cover has been reduced and the bullets now mushroom fairly well. Mushroom much surer if you file the tip off just a trifle or put a hole in the tip.

10. REMINGTON CORE LOCT HOLLOWPOINT MUSHROOMING BULLETS

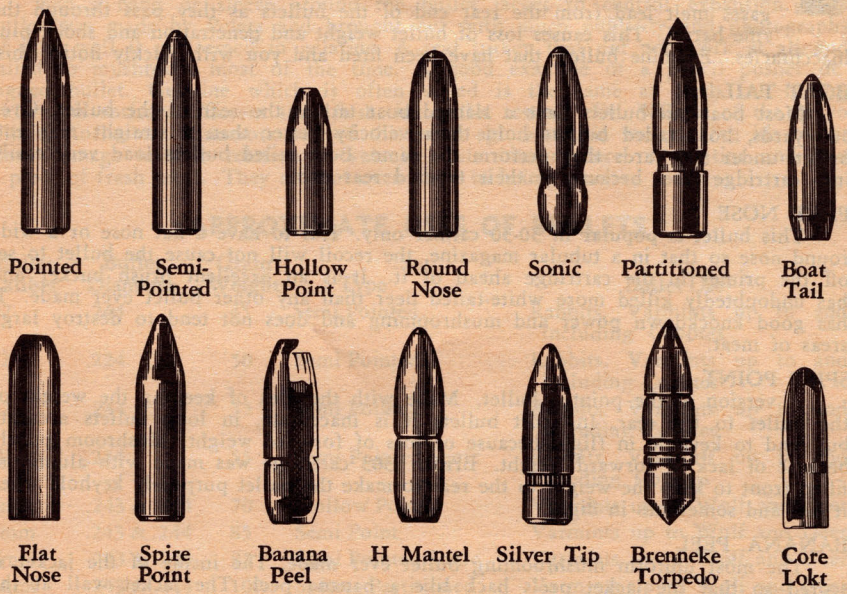
The jacket of the bullet is thickened at the waist to stop mushrooming and air penetration. Ups pressures a little and slows velocity. As most hollow point gilding metal jacketed bullets mushrooming is poor and unreliable. The best mushrooming

hole is a cone, the poorest, a straight hole with square bottom or straight hole with a ball bottom.

11. BANANA PEEL MUSHROOMING BULLETS

These bullets are made in Sweden with gilding metal jackets. The inside of the jackets on the upper half of the bullet are scored lengthwise or cut half way through so to speak before the jackets are filled with lead. When the bullet strikes, the front half of the jacket peels back just like a banana leaving the lead core mushroom in a perfect circle yet hold together and give deep penetration. The most uniform mushrooming bullet ever made, far superior to the H-Mantel, Silver Tip, Core Lokt etc.

Bullet weight and type selection are in actual practice not too critical for hunting purposes. Most any bullet type and weight will kill an animal when hit in a vital spot. You can only kill an animal dead and any bullet that does this is satisfactory. Jacques P. Herter as well as myself have killed everything from Buffalo to Moose with everything from .22 Rimfire cartridges up to shotgun slugs and everything up to elephants with the .300 Ram Magnum.



In brief here is a short description of a few of the better known common bullet types for rifles.

POINTED OR SPITZER

Good wind bucking, tend to deflect when they strike brush. Tend to tumble in large animals.

SEMI POINTED OR SEMI-SPITZER

Good wind bucking. Tend to deflect less than pointed when they strike brush. Most widely used game type of bullet point.

HOLLOW POINT

It has a hole in the end of the bullet. Mushrooms very easily. Explodes readily when they hit a hard object. Good in populated areas.

ROUND NOSE

Poor wind bucker. Excellent in brush as it does not deflect when it strikes. Mushrooms very easily and well.

SONIC OR WASP WAIST

Most accurate bullet shape made. Forms its own partition as it mushrooms. Is best for high velocity loads as it has the least barrel wear of any bullet. Will not

disintegrate at high velocities. It has less "yaw" or bullet wobble than any bullet. The sonic bullet is deformed by the barrel's lands and grooves less than any other bullet. Should be used in all high velocity cartridges.

PARTITIONED

Herter's make a true partitioned bullet with a solid partition of the bullet jacket metal right across the bullet. Nosler makes a bullet with the bullet jacket only partly across the bullet actually not forming a true partition at all. Both the Herter and Nosler bullets of this type penetrate and mushroom well but both lose the lead in the forward part of the bullet as they penetrate lightening the bullet and reducing the penetration and shock of the bullet. The sonic type of bullet will out penetrate and out mushroom either one of

Nosler Bullet.

them by a wide margin. Both the Herter and Nosler partitioned bullets have no jacket metal on their rear end and if the powder load is too hot the gases melt lead from the rear end of the bullets as they pass through the rifle barrel. This causes loss of bullet weight and penetration and shock plus inaccuracies. Examine bullets that have been fired and you will quickly notice this.

BOAT TAIL

Most boat tail bullets have a slanted boat tail at the rear of the bullet. Over 500 yards, boat tailed bullets hold their velocity better than a straight rear end bullet, under 500 yards they perform the same. Boat tailed bullets load very easily into cartridge cases because of their tapered rear end.

FLAT NOSE

This bullet is popular in 30-30 caliber only. Has to have a flat nose or a wide round nose so that in a tubular magazine, the recoil will not cause the bullet to set off the primer in the cartridge ahead of it. It is an excellent brush bucker and has undoubtedly killed more white-tailed deer than any other bullet ever made. It has good knockdown power and mushrooming and does not tend to destroy large areas of meat.

SPIRE POINT

A version of the pointed bullet. Made with the idea of keeping the weight of the bullet to the rear. In short bullets it is inaccurate, in long bullets accurate but tend to keyhole in flight because of loss of forward weight. Mushroom poorly because of lack of forward weight. British .303 cartridge was made with aluminum filled front to keep the weight to the rear to make the bullet purposely keyhole when it hits and sometimes in flight.

BANANA PEEL

The most uniform mushrooming bullet ever made. The inside of the jacket is scored so that the jacket peels back like a banana peel. The jacket wall at the end of the scoring is made heavy and holds the mushroomed bullet firmly together.

H MANTEL

Made by Rheinisch Westfausche Sprengstoff Actien Gesellshaft, RWS Brand Ammunition. Patented 1932. Patent clearly shows that Brennecke had nothing to do with the design or development of this bullet.

The bullet jacket is crimped in to form a small shelf that stops the mushrooming and holds the mushroomed bullet together but the front of the bullet is too light and breaks up. A poor game bullet, popular in neither Europe nor here.

SILVER TIP

Made only by Winchester. This bullet has a soft nickel and copper alloy cover for the lead nose. The cover goes down inside of the heavy copper jacket. The copper jacket is knurled in the middle to form a small shelf on the inside of the bullet to stop further mushrooming when it reaches this point. For a long while these bullets would not mushroom at all unless they struck a heavy bone well and were not at all satisfactory. Still rarely used in Alaska because of this. They now have been completely changed and the bullet tip cover made much lighter and they now mushroom well. To make them mushroom better you can drill a small hole through the nickel and copper cover.

BRENNEKE TORPEDO

Made by Herman Brennecke, Leipzig, Germany, gunmaker. He also made the 7 x 64 rimless cartridge copied by Winchester for the .270.

These bullets have a pointed rear end and lead in the rear of the bullet with a light alloy forward. Fairly popular in Europe and a fair big game bullet. Mushroom fair and tumble in flesh well.

CORE LOKT

These are made by Remington. The bullet jacket is simply made thicker in the middle to stop mushrooming at a reasonable point. The front of the jacket is made scalloped which exposes too much of the soft lead tip making the tip susceptible to damage in handling. The hollow point version does not have the scalloped jacket and does not give too good controlled expansion. Both versions far inferior to the "Banana Peel" type of bullet.

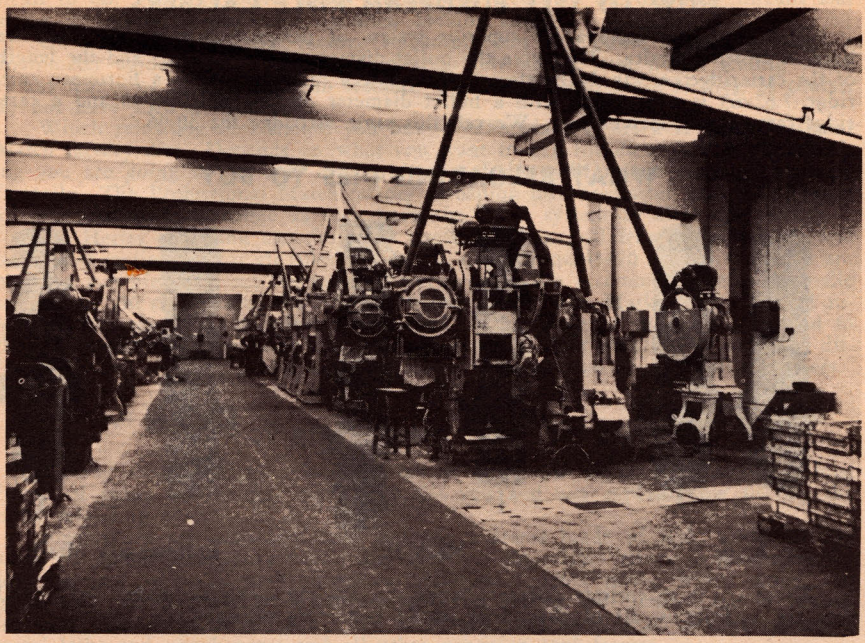
PETER'S BELTED BULLET

Had a band or sleeve around the bullet jacket to control expansion. This bullet was made by Peters and brought out with much publicity and photographs of how well it performed in gelatine. A real turkey that did not work at all and failed to mushroom most of the time. A good example of a pencil pusher designed bullet. Gelatine which is often stated is the same as flesh for testing bullets, is entirely different than flesh, for bullet testing. Dr. Wilson of the Mayo Clinic, Rochester, Minnesota proved this years ago when he was making his bullet flesh damage tests in relation to velocity. Bite into a piece of gelatine and into a piece of fresh meat. They are not even close to being similar.

APPROXIMATE USES OF BULLETS

Bullet Caliber	Bullet Diameter	Grain Weight	Type	Bullet Use
22	.244	45	Semi Pointed	Rabbits, Varmints up to and including Coyotes
22	.224	50	Semi Pointed	Rabbits, Varmints up to and including Coyotes
22	.244	55	Semi Pointed	Rabbits, Varmints up to and including Coyotes
22	.224	55	Semi Pointed Sonic	Rabbits, Varmints up to and including Coyotes
6mm	.243 & .244	70	Hollow Point	Varmints up to Wolf and Deer
6mm	.243 & .244	85	Semi Point	Varmints up to Wolf and Deer
6mm	.243 & .244	85	Semi Pointed Sonic	Varmints up to Wolf and Deer
6mm	.243 & .244	100	Spitzer Partitioned	Varmints up to Wolf and Deer
6mm	.243 & .244	100	Semi Pointed	Varmints up to Wolf and Deer
247 HRM	.248	76	Semi Pointed	Varmints up to Wolf and Deer
247 HM	.248	87	Semi Pointed	Varmints up to Wolf and Deer
247 HRM	.248	117	Semi Pointed	Varmints up to Moose
25	.257	87	Hollow Point	Varmints up to Wolf and Deer
25	.257	100	Semi Pointed	Varmints up to Wolf and Deer
25	.257	117	Semi Pointed	Varmints up to Wolf and Deer
6.5mm	.263 & .264	130	Semi Pointed	Varmints up to Wolf and Deer
6.5mm	.263 & .264	150	Round Nose	Varmints up to Wolf and Deer
270	.277	110	Hollow Point	Varmints up to Wolf and Deer
270	.277	130	Semi Pointed	Varmints up to Wolf and Deer
270	.277	130	Semi Pointed Sonic	Varmints up to Wolf and Deer
270	.277	130	Spitzer Partitioned	Varmints up to Wolf and Deer
270	.277	150	Round nose	Varmints up to Wolf and Deer
7mm	.284	139	Hollow Point	Deer to Bear and all African game except Elephant, Rhino and Buffalo

Bullet Caliber	Bullet Diameter	Grain Weight	Type	Bullet Use
7mm	.284	139	Semi Pointed	Deer to Bear and all African game except Elephant, Rhino and Buffalo
7mm	.284	175	Round Nose	Deer to Bear and all African game except Elephant, Rhino and Buffalo
30	.308	110	Round Nose	Varmints up to Wolf and Deer
30	.308	125	Hollow Point	Deer to Bear and all African game except Elephant, Rhino and Buffalo
30	.308	150	Semi Pointed	Deer to Bear and all African game except Elephant, Rhino and Buffalo
30	.308	150	Semi Pointed Sonic	Deer to Bear and all African game except Elephant, Rhino and Buffalo
30	.308	150	Flat Nose Cannelured	Deer to Bear, and all African game except Elephant, Rhino and Buffalo
30	.308	150	Spitzer Partitioned	Deer to Bear and all African game except Elephant, Rhino and Buffalo
30	.308	168	Boat Tail Match	Deer to Bear, and all African game except Elephant, Rhino and Buffalo
30	.308	170	Round Nose Cannelured	Deer to Bear and all African game except Elephant, Rhino and Buffalo
30	.308	180	Boat Tail Match	All game
30	.308	180	Semi-Pointed	All game
30	.308	180	Semi Pointed Sonic	All game
30	.308	220	Round Nose	All game
31	.312	150	Semi-Pointed	Deer to Bear and all African game except Elephant, Rhino and Buffalo
31	.312	180	Semi Pointed	Deer to Bear and all African game except Elephant, Rhino and Buffalo
8mm	.323	150	Semi Pointed	All game
8mm	.323	180	Round Nose	All game
8mm	.323	180	Semi Pointed	All game
8mm	.323	236	Round Nose	All game
33	.338	200	Round Nose	All game
33	.338	265	Round Nose	All game
35	.358	200	Semi Pointed	All game
35	.358	250	Round Nose	All game
375	.375	235	Semi Pointed	All game
375	.375	300	Round Nose	All game
45	.458	350	Round Nose Cannelured	All game
45	.458	400	Round Nose Cannelured	All game



Modern cartridge loading and assembly plant.

Modern bullet jacket making machine plant.